AMENDMENT TO THE SPECIFICATION

Please replace lines 8–17 on page 1 with the following amended text:

BACKGROUND OF THE INVENTION

Current methods for manufacturing diamond films by microwave-plasma-assisted chemical ~~vapour~~ vapor deposition (MP-CVD) are of limited effectiveness. ~~since the~~ The large amounts of energy, which are needed to obtain diamond of electronic quality at reasonable growth rates (about 2 μm/h), lead to heating of the walls. ~~on which~~ This process causes hydrogen atoms ~~contained~~ in the plasma, ~~that~~ which activate the reaction, to recombine and ~~therefore cannot~~ not participate in the reaction. It is therefore necessary to install a constricting device for cooling the walls.

Please insert the following text on page 1, line 35:

BRIEF SUMMARY OF THE INVENTION

Please replace lines 11–17 on page 2 with the following amended text:

For this purpose, the invention provides a process for manufacturing a diamond film assisted by a pulsed microwave plasma, which, apart from the above mentioned ~~abovementioned~~ features, is characterized in that power is injected into the volume of the plasma with a peak power density of at least 100 W/cm^3 while maintaining the substrate to a substrate temperature of between 700 °C and 1000 °C.

Please insert the following text on page 4, line 15:

BRIEF DESCRIPTION OF THE DRAWINGS

Please insert the following text on page 4, line 25:

DETAILED DESCRIPTION OF THE INVENTION

Please replace lines 26–38 on page 4 with the following amended text:

Figure 1 shows an example of how to implement the method according to the invention using a vacuum chamber 1 containing a support 2 placed on its base 3. This vacuum chamber is placed in a Faraday cage 13 acting as a cavity or the vacuum chamber itself acts as a cavity. Also, in the vacuum chamber is a single injection nozzle 4~~,~~ or a plurality of injection nozzles. The injection nozzle~~, for emitting~~ emits, into the vacuum chamber, gases comprising~~, ~~: ~~on the one hand,~~a) a source of molecular hydrogen, such as dihydrogen (H_2~~,~~); and~~, on the other hand,~~ b) a source of carbon, such as ~~for example~~ a hydrocarbon like methane (CH_4), carbon dioxide (CO_2) or like.

Please replace lines 33–39 on page 7 and lines 1–4 on page 8 with the following amended text:

These conditions greatly ~~favour~~favor the disruption of the molecular hydrogen H_2 emitted by the injection nozzle 4 and the formation of carbon-containing radicals. A concentration between 1.7×10^{16} cm^{-3} and 5×10^{17} cm^{-3} of atomic hydrogen in the plasma ~~of between 1.7×10^{16} cm^{-3} and 5×10^{17} cm^{-3}~~ may be measured. Such ~~an~~ atomic hydrogen concentrations make~~s~~ it possible to increase the reaction rate for depositing the carbon-containing radicals contained in the plasma in the form of a diamond to a high reaction rate, while guaranteeing the electronic quality of the diamond film produced. These conditions thus advantageously allow the concentration of carbon-containing radicals in the plasma to be increased so that the latter may contain between 2×10^{14} cm^{-3} and 1×10^{15} cm^{-3} CH_3 radicals. Since the incorporation of carbon atoms into the diamond film 8 being formed is substantial, the molecular methane may be emitted by the injection nozzle 4 with a molar ratio ~~with respect to molecular hydrogen H_2~~ of possibly up to 12% (with respect to molecular hydrogen, H_2).

Please replace lines 35–39 on page 9 and lines 1–16 on page 10 with the following amended text:

The lifetime T_V of the atomic hydrogen H in the plasma 7 may be determined, for example, by a known plasma induced fluorescence (PIF) technique. As shown in Figure 2b, PIF technique ~~consisting~~ consists of ~~in~~ generating~~, as shown in Figure 2b, in addition to~~ the first power peak ~~of~~ that has the duration T_{on}~~, with~~ and ~~a~~the peak power P_C, and the second ~~a second~~ power peak~~,~~ ~~after the first,~~ that occurs at a defined time T_0 taken between T_{on} and T. The second peak is ~~and~~ of short duration, for example about 1/10 of T_{on}. The second peak~~, which~~, by direct collision with an electron, excites the hydrogen atoms H still present in the plasma 7 at time T_0~~,~~. ~~this~~ This excitation is ~~being~~ measured and compared with the excitation caused by the first peak of the discharge, thereby making it possible to determine the concentration of hydrogen atoms H remaining in the plasma 7 at time T_0. Determining the concentration of hydrogen atoms remaining in the plasma thus allows to determine ~~and therefore~~ the hydrogen atom lifetime under the given conditions of the plasma. Optionally, this information may be transmitted to the microwave generator 6 which adapts the parameters of the discharge accordingly. Other known techniques, such as laser-induced stimulated emission (LISE) or two photon laser-induced fluorescence may be used in this context.